

## DOE National Laboratories... The Origin of New Energy

# Technologies

FOR THE 21ST CENTURY

U.S. DEPARTMENT OF ENERGY  
OFFICE OF ENERGY EFFICIENCY  
AND RENEWABLE ENERGY



The national laboratory system began in the 1940s, driven by World War II. Today, the U.S. Department of Energy (DOE) has nearly 30 laboratories across the country, representing a collection of scientific assets; including staff, equipment, and facilities, unparalleled in their capabilities. Research funded by DOE's Office of Energy Efficiency and Renewable Energy (EERE) is taking place at a number of these labs, and it is an important part of the national laboratory system's portfolio. Research and development (R&D) performed for EERE takes advantage of many fields of inquiry, from basic biological research on plants at Oak Ridge National Laboratory, to the dynamics of energy conversion at the National Renewable Energy Laboratory and Sandia National Laboratories, to fundamental atomic and molecular science at Argonne National Laboratory.

### Entree to the Best of the Best

DOE national laboratories have extensive R&D expertise and unique facilities and equipment to advance energy efficiency and renewable energy technologies. They house specialized test facilities and equipment that are too costly for individual industries or organizations to maintain. By providing user facilities to our industries, we create an even playing field for competitive commerce within the nation and give U.S. industry a springboard into the global marketplace. The breakthroughs pioneered at the national laboratories in the 21st century will continue to help shape the nation's clean energy future.

### Laboratories Working with EERE

**Argonne National Laboratory (ANL)** — Located near Chicago, Argonne scientists and engineers develop technologies and processes to improve energy efficiency and reduce emissions. The Transportation Technology R&D Center (TTR&DC) conducts research on automobiles, trucks, railroads, and transportation systems; there are facilities for battery analysis and diagnostics, powertrain and engine testing, conventional and

alternative fuels, metals and ceramics, friction and wear, rapid prototyping, laser processing, and high performance computing. Argonne supports EERE's Industries of the Future Program, with collaborative research focused on energy-intensive industries such as refining, forest products, glass, aluminum, steel, and chemicals. Argonne develops and operates laboratory and pilot-scale facilities to develop cost-effective processes to recover, recycle, and reuse plastics, metals, and chemicals. Visit [www.anl.gov](http://www.anl.gov)

**Idaho National Engineering and Environmental Laboratory (INEEL)** — Located in and around Idaho Falls, Idaho, INEEL conducts research to support several EERE programs such as hybrid and electric vehicle research; advanced automotive technologies; intelligent transportation systems; alternative fuels (natural gas, in particular); and alternative energy storage and supply systems. Visit [www.inel.gov](http://www.inel.gov)

**Ernest Orlando Lawrence Berkeley National Laboratory (LBNL)** — Located in the Berkeley Hills of California, LBNL research investigates materials, life sciences, and energy



NREL/PIX 05436, WARREN GRETZ

*NREL's biomass analysis capabilities lead to a greater understanding of its use as a renewable resource.*



NREL/PIX 05088, IDAHO NATIONAL ENGINEERING AND ENVIRONMENTAL LABORATORY

*As part of its liquefied natural gas (LNG) R&D program, INEEL uses this skid-mounted LNG fueling station that can be moved to various locations to service its natural gas vehicles.*



NREL/PIX 01820, JIM YOST

*A National Center for Photovoltaics engineer at Sandia National Laboratory uses a hail tester to determine the ability of a PV module to withstand the impact of hail stones.*

*"This country must sustain world leadership in science, mathematics, and engineering if we are to meet the challenges of today...and of tomorrow."*

PRESIDENT BILL CLINTON, NOVEMBER 1993

## DOE NATIONAL LABORATORIES

efficiency. The Environmental Energy Technologies Division explores energy efficient technologies for the buildings sector: windows; lighting and day-lighting; simulation tools; ventilation, infiltration, and thermal distribution systems; and appliance and equipment standards. Other EERE areas include the Federal Energy Management Program, utility deregulation, and global climate change. Visit [www.lbl.gov](http://www.lbl.gov)

### **Lawrence Livermore National**

**Laboratory (LLNL)** — Located in Livermore, California, LLNL's research support to EERE focuses on the Industries of the Future strategy led by DOE's Office of Industrial Technologies. The laboratory works cooperatively with EERE and key industries—aluminum, chemicals, forest products, glass, metalcasting, steel, and agriculture—to develop processes that increase productivity and minimize energy use. LLNL staff works with other EERE offices on hydrogen conversion research. Visit [www.llnl.gov](http://www.llnl.gov)

### **National Renewable Energy**

**Laboratory (NREL)** — Located in Golden, Colorado, NREL develops renewable energy and energy efficiency technologies and works to transfer these technologies to the private sector. NREL

conducts research on photovoltaics, wind energy, biomass-derived fuels and chemicals, buildings, advanced vehicles, industrial processes, solar thermal systems, hydrogen fuel cells, superconductivity, geothermal and waste-to-energy technologies. Several of EERE's scientific user facilities are located at NREL, including the Alternative Fuels User Facility, the Field Test Laboratory Building, the High-Flux Solar Furnace, the National Wind Technology Center, the Outdoor Test Facility for photovoltaics testing and experiments, the Solar Energy Research Facility, the Solar Radiation Research Laboratory, and the Thermal Test Facility. Visit [www.nrel.gov](http://www.nrel.gov)

### **Oak Ridge National Laboratory**

**(ORNL)** — Located in Oak Ridge, Tennessee, ORNL works with several EERE sectors. Technologies for transportation systems include automotive technologies, materials, and use of alternative fuels. Technologies for the building sector include heating, cooling, and refrigeration equipment; roofs, walls, and foundations; and retrofit of existing structures. Research for industrial processes includes bioprocessing, electric motors, turbines, materials, and heat pumps. Technologies for utilities include high-temperature superconductors, power transmission and distribution systems, and electromagnetic field effects. ORNL is home to two national user facilities—the High Temperature Materials Laboratory and the Buildings Technology Center. Visit [www.ornl.gov](http://www.ornl.gov)

### **Pacific Northwest National**

**Laboratory (PNNL)** — Located in Richland, Washington, PNNL conducts research in energy, the environment, and the economy. PNNL's work for EERE focuses on buildings and transportation research. Building research concentrates on developing and deploying energy codes and commercial equipment standards as well as on products that enhance the efficiency of buildings. Research in the transportation sector focuses on lightweight materials, emissions control, and microtechnologies. Visit [www.pnl.gov](http://www.pnl.gov)

### **Sandia National Laboratories (SNL)** —

Located in Albuquerque, New Mexico, and Livermore, California, SNL supports EERE in developing commercially viable energy technologies based on solar, wind, and geothermal resources. Sandia houses two DOE's user facilities: the Solar Thermal Design Assistance Center and the National Solar Thermal Test Facility. Visit [www.sandia.gov](http://www.sandia.gov)

### **Access to Virtual Resources**

DOE's Laboratory Coordinating Council (LCC) provides access to some of the finest research facilities in the world. The LCC serves as a "virtual" laboratory that can be tailored to meet the research needs of almost any industry. Industry researchers no longer need to approach each lab separately because the LCC functions in a distributed manner through common intellectual property agreements and other mechanisms. Visit [www.oit.doe.gov/LCC](http://www.oit.doe.gov/LCC)



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